

CLAIMS

1. A surface treatment method in which the surface of recorded matter in which images are recorded on a recording medium is treated using a treatment agent.

2. The surface treatment method according to claim 1, wherein said treatment agent is a treatment agent which contains one or more active constituents selected from the group consisting of sulfur compounds, nitrogen compounds, fluorine compounds, natural resins and synthetic resins, or a treatment agent comprising water or an organic solvent.

3. The surface treatment method according to claim 2, wherein said sulfur compounds consist of one or more compounds selected from the group consisting of thiocyanic acid, thiosulfuric acid, thiourea, thio ether compounds, hetero-ring-containing thiol compounds, sulfur halides, sulfur oxyhalides, halogenosulfonic acids and derivatives of these compounds.

4. The surface treatment method according to claim 2, wherein said nitrogen compounds consist of one or more compounds selected from the group consisting of aliphatic amine compounds, alicyclic amine compounds, aromatic amine compounds, quaternary ammonium salts, polyamines and polyamine

derivatives, amine condensates, amino acids and amino acid derivatives.

5. The surface treatment method according to claim 2, wherein said fluorine compounds consist of nonionic, cationic or anionic fluorine-atom-containing surfactants, or fluorine-modified resins.

6. The surface treatment method according to claim 2, wherein said natural resins consist of one or more compounds selected from the group consisting of carnauba wax, beeswax, rice wax, Japan wax, hohoba oil, spermaceti, candelilla wax, lanolin, montan wax, ozokerite, ceresin, paraffin wax, microcrystalline wax and petrolactam.

7. The surface treatment method according to claim 2, wherein said synthetic resins consist of one or more compounds selected from the group consisting of cellulose type resins, vinyl type resins, acrylic type resins, polyester resins, silicone oils, UV-curable resins, thermosetting resins, polyurethane resins, modified epoxy resins and phenol resins.

8. The surface treatment method according to claim 2, wherein said treatment agent contains a mixture of two or more compounds selected from the group consisting of sulfur

compounds, nitrogen compounds, fluorine compounds, natural resins and synthetic resins.

9. The surface treatment method according to claim 2, wherein said recording medium is a recording medium in which an ink receiving layer is disposed on a support.

10. The surface treatment method according to claim 2, wherein said treatment is a spray treatment, blowing treatment, coating treatment, immersion treatment or treatment using an ink jet recording head.

11. The surface treatment method according to claim 1, wherein said treatment agent is an aqueous solution which contains a water-soluble resin, a light resistance improving agent and an ink fixing agent, and said water-soluble resin is a resin which, when applied to the surface of an image of printed matter (printed matter in which the water-resistant base material in the recording medium is a water-resistant paper with an oxygen permeability of  $30 \text{ cc}/(\text{m}^2 \times \text{D} \times \text{atm})$  or more in an environment with a temperature of  $20^\circ\text{C}$  and a relative humidity of 90%, and in which images have been formed in the ink receiving layer by means of a dye ink) at the rate of  $7 \text{ g}/\text{m}^2$ , is capable of limiting the oxygen permeability of said printed matter in an environment with a temperature of

20°C and a relative humidity of 90%, to a value of  $10 \text{ cc}/(\text{m}^2 \times \text{D} \times \text{atm})$  or less.

12. The surface treatment method according to claim 11, wherein said treatment agents contains said water-soluble resin at the rate of 1 to 70 wt %, said light resistance improving agent at the rate of 0.01 ~ 20 wt %, and said ink fixing agent at the rate of 0.01 ~ 10 wt %.

13. The surface treatment method according to claim 11, wherein said treatment agent further contains an alcohol, and the content of said alcohol is 1 ~ 80 wt %.

14. The surface treatment method according to claim 11, wherein said water-soluble resin is an ethylene - polyvinyl alcohol copolymer or a polyvinylidene chloride.

15. The surface treatment method according to claim 11, wherein said light resistance improving agent consists of one or more agents selected from the group consisting of ultraviolet absorbing agents and hindered amine type light stabilizers.

16. The surface treatment method according to claim 11, wherein said ink fixing agent consists of one or more agents

selected from the group consisting of cationic organic substances.

17. The surface treatment method according to claim 11, wherein the treatment performed using said treatment agent is performed by a method in which said untreated printed matter is immersed in said treatment agent, or a method in which said treatment agent is sprayed onto said untreated printed matter.

18. The surface treatment method according to claim 11, wherein said printed matter obtained by treatment with said treatment agent and drying is treated with said treatment agent so that a protective layer with a thickness of 0.1 to 50  $\mu\text{m}$  is disposed on said ink receiving layer.

19. The surface treatment method according to claim 11, wherein said printed matter is printed matter that is recorded on said recording medium by ink jet recording using said dye ink.

20. The surface treatment method according to claim 1, wherein said treatment agent is comprised of oil and fat as a main component.

21. The surface treatment method according to claim 20, wherein said oil and fat consist of linolic acid, oleic acid,

linolenic acid, palmitic acid, stearic acid or two or three types of glycerol esters of these acids.

22. The surface treatment method according to claim 20, wherein said treatment agent further contains an oil-soluble anti-oxidant.

23. The surface treatment method according to claim 20, wherein said treatment agent further contains an oil-soluble ultraviolet absorbing agent.

24. The surface treatment method according to claim 20, wherein said treatment agent further contains an oil-soluble light stabilizer.

25. The surface treatment method according to claim 20, wherein said recording medium is a recording medium in which an ink receiving layer is disposed on a base material.

26. The surface treatment method according to claim 20, wherein said treatment is a spray treatment, blowing treatment, coating treatment or immersion treatment.

27. The surface treatment method according to claim 25, which is characterized in that said ink receiving layer contains silica and/or alumina.

28. The surface treatment method according to claim 25, which is characterized in that the void ratio of said ink receiving layer is 30% or greater.

29. The surface treatment method according to claim 20, wherein said recording medium has a resin-coated paper as a base material.

30. The surface treatment method according to claim 1, wherein said treatment agent is comprised of an oil-form substance as a main component.

31. The surface treatment method according to claim 30, wherein the oil-form substance is a nonvolatile liquid at ordinary temperatures.

32. The surface treatment method according to claim 30, wherein the boiling point of the oil-form substance is 200°C or greater.

33. The surface treatment method according to claim 30, wherein the boiling point of the oil-form substance is 300°C or greater.

34. The surface treatment method according to claim 30, wherein the oil-form substance is a mineral oil.

35. The surface treatment method according to claim 30, wherein the oil-form substance is liquid paraffin.

36. The surface treatment method according to claim 30, wherein said treatment agent further contains an oil-soluble anti-oxidant.

37. The surface treatment method according to claim 30, wherein said treatment agent further contains an oil-soluble ultraviolet absorbing agent..

38. The surface treatment method according to claim 30, wherein said treatment agent further contains an oil-soluble light stabilizer.

39. The surface treatment method according to claim 38, wherein the oil-soluble light stabilizer is a hindered amine type compound.

40. The surface treatment method according to claim 30, wherein said recording medium is recording medium in which an ink receiving layer is disposed on a base material.



41. The surface treatment method according to claim 30, wherein said treatment is a spray treatment, blowing treatment, coating treatment or immersion treatment.

42. The surface treatment method according to claim 40, which is characterized in that said ink receiving layer contains silica and/or alumina.

43. The surface treatment method according to claim 30, which is characterized in that the void ratio of said ink receiving layer is 30% or greater.

44. The surface treatment method according to claim 30, wherein said recording medium uses a resin-covered paper as a base material.

45. The surface treatment method according to claim 1, comprising the steps of:

detecting the type of said recording medium;

determining the type of treatment agent in

accordance with the detected type of said recording medium;

and

discharging said determined treatment agent onto said recorded surface so that a protective layer that protects this recorded surface is formed.

46. A treatment agent which is used in the surface treatment method according to claims 1 through 45.

47. A surface-treated product which is characterized in that recorded matter is treated using the surface treatment method according to claims 1 through 45.

48. A surface treatment apparatus for recorded matter in which the surface of recorded matter in which images are recorded on a recording medium is treated using a treatment agent, said surface treatment apparatus comprising a treatment agent discharge part which discharges the treatment agent according to claims 1 through 45 onto the recorded matter.

49. The surface treatment apparatus according to claim 48, which further comprises:

- a paper supply and discharge port;
- a treatment agent wiping part;
- a paper feeding part; and
- driving means for driving said treatment agent discharge part and paper feeding part.

50. The surface treatment apparatus according to claim 48, which is characterized in that said surface treatment apparatus is a printer, and said printer comprises an ink discharge part which discharges ink onto the recording medium,

and a treatment agent discharge part which is disposed on the after-side of said ink discharge part with respect to the feeding direction, and which discharges the treatment agent onto the recorded matter.

51. The surface treatment apparatus according to claim 50, which further comprises a treatment agent wiping part.

52. The surface treatment apparatus according to claim 48, which is characterized in that said surface treatment apparatus is a surface treatment kit, and said surface treatment kit comprises treatment agent coating means for applying the treatment agent to the recorded matter as a coating, and wiping means for [wiping] this treatment agent.

53. The surface treatment apparatus according to claim 48, which is characterized in that said surface treatment apparatus is a surface treatment kit, and said surface treatment kit comprises treatment agent coating means for applying the treatment agent to said recorded surface while directly contacting said coating surface.

54. The surface treatment apparatus according to claim 53, which is characterized in that said surface treatment kit comprises wiping means consisting of an elastic member for

wiping away the excess portion of the treatment agent that is applied to said recorded surface as a coating.

55. The surface treatment apparatus according to claim 54, wherein said wiping means comprise a member that has liquid absorbing properties.

56. The surface treatment apparatus according to claim 53, wherein said surface treatment kit has a treatment agent coating apparatus which comprises a tank member that accommodates said treatment agent, and a coating head that has said treatment agent coating means.

57. The surface treatment apparatus according to claim 56, wherein a cap member that protects said coating head is attached to said coating head in a detachable manner.

58. The surface treatment apparatus according to claim 56, wherein a replenishment port for replenishing the treatment agent is formed in said tank member.

59. The surface treatment apparatus according to claim 56, wherein said tank member is formed from a material that is insoluble with respect to said treatment agent.

60. The surface treatment apparatus according to claim 53, which comprises coating amount adjustment means for adjusting the coating amount of the treatment agent from the treatment agent coating means.

61. The surface treatment apparatus according to claim 53, wherein recording is performed on said recording medium by an ink jet system.

62. The surface treatment apparatus according to claim 50, which is characterized in that said printer has a treatment agent cartridge that accommodates at least two different types of treatment agents.

63. The surface treatment apparatus according to claim 62, wherein said treatment agent cartridge accommodates at least a lustering liquid and a matte finishing treatment liquid.

64. The surface treatment apparatus according to claim 50, which is characterized in that said printer has an ink cartridge which comprises at least one ink accommodating compartment that accommodates at least one type of ink, and treatment agent accommodating compartments that accommodate at least two different types of treatment agents.

65. The surface treatment apparatus according to claim 64, wherein said ink cartridge accommodates at least a lustering liquid and a matte finishing treatment liquid.

66. The surface treatment apparatus according to claim 50, which is characterized in that said printer comprises detection means for detecting the type of the recording medium, and control means for determining which of said two or more types of treatment agents is to be applied to the recorded surface as a coating in accordance with the type or recording medium.